# The role of Culture in Long-term Care

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# About this paper

Research question:

**What is the role of culture in shaping long-term care (LTC) arrangement decisions?**

Motivation:

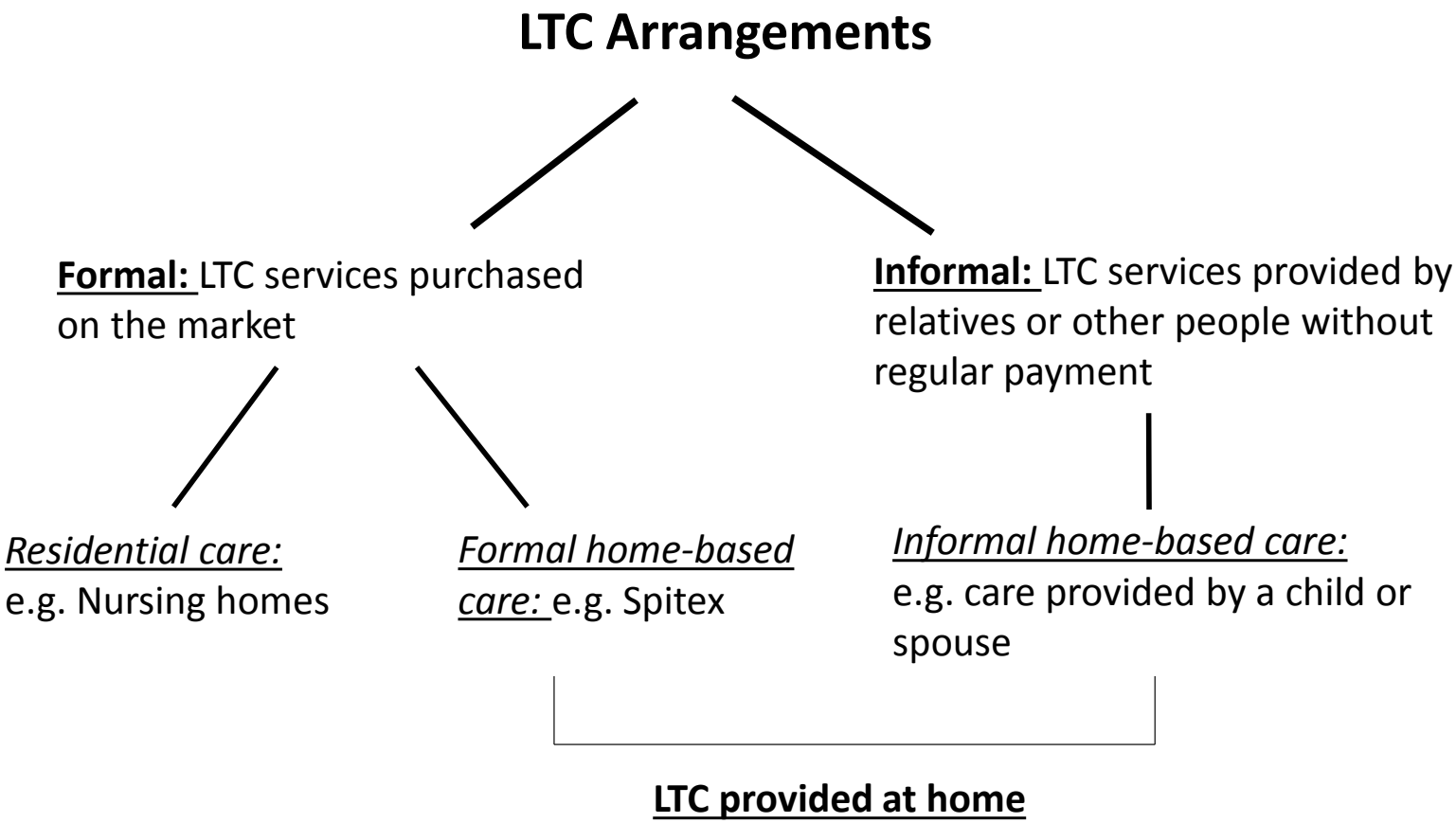
1. Rising LTC expenditure - Cost containment;
2. Satisfy individual preferences - Welfare maximization.

Empirical strategy:

- Regression discontinuity design at Rösti border focusing on the three bilingual cantons (Berne, Valais and Fribourg) - **individual** level data;
- Exploit within-canton variation in the language spoken to provide further evidence - **district** level data.

Main results:
People from Latin speaking regions enter in nursing homes **in worse health conditions** and **demand more home-based care** services.

# LTC services - overview

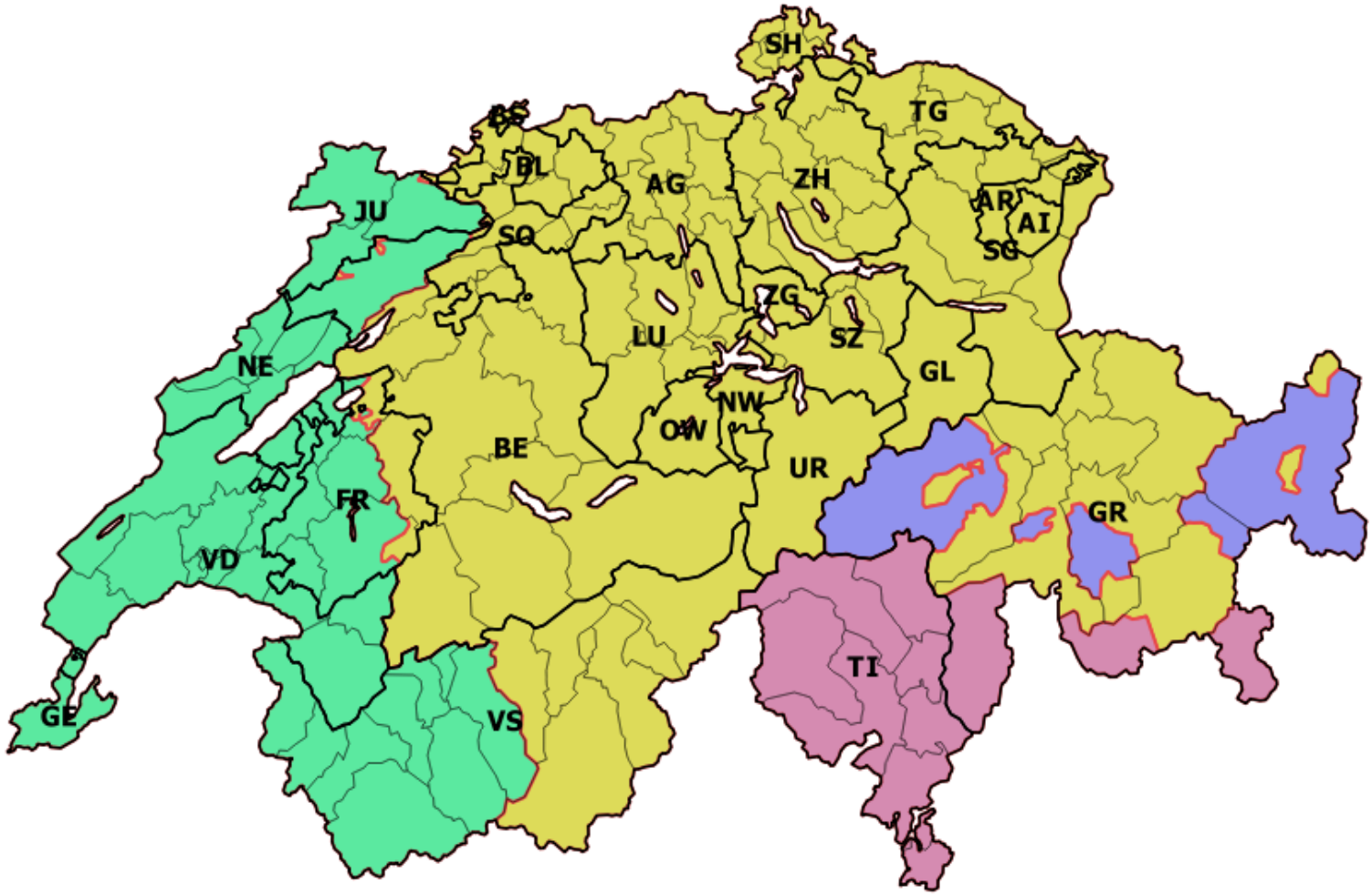


# The choice of LTC arrangements

LTC arrangements respond to different needs and the choice among them is the result of different factors.

- Health condition (e.g., Norton, 2000)
- Availability of substitutes for care (e.g., Charles and Sevak, 2005; Bonsang et al., 2009)
- Payment schemes (e.g., Pezzin et al. 1996; Orsini, 2010)
- Cultural differences (Bolin et al., 2008; Costa-Font, 2010)

# Why Switzerland?




▸ physical map

# Conceptual framework (1)

Household utility function and BC:

$$U(C, NH, HB) = C + d\phi(\delta HB + (1-\delta)NH) \qquad d, \delta \in [0,1]$$

$$C + p_h(d)HB + p_n NH = \omega, \qquad p_h'(d) > 0$$

with:

- $\phi(.)$: continuous and concave funtction in LTC provision;
- $d$: intensity of care required by the elderly person - i.e. dependency level;
- $\delta$: preference parameter for home-based care;
- $p_h(d)$: (daily) price of home-based care;
- $p_n$: (daily) price of nursing home.

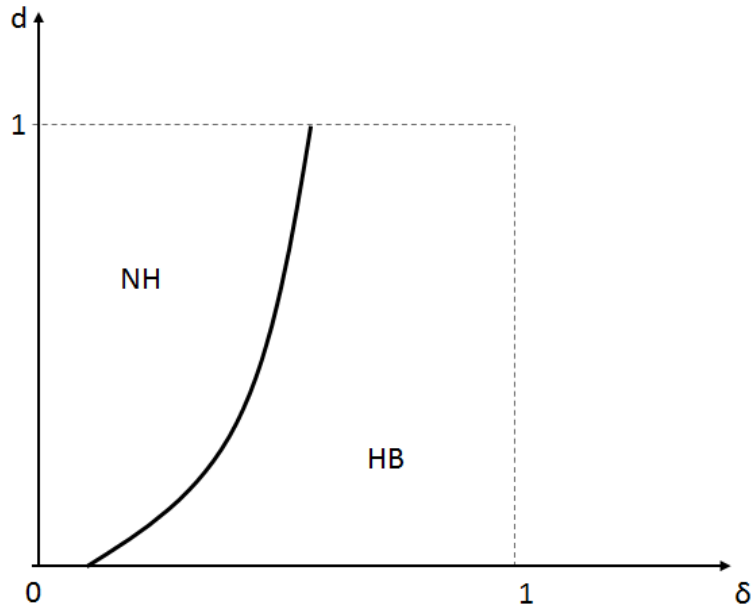
# Conceptual framework (2)

**Indifference condition and threshold dependency level at entry**:

*People enter NH when the weighted price of one day in NH is smaller than the weighted price of one day in HB care.*

$$\delta p_n = (1-\delta) p_h(d)$$

$$d^* = p_h^{-1}\left(\frac{\delta}{1-\delta} p_n\right)$$




**Operational intuition:** *higher preference for care at home should reflect into higher dependency level at entry in nursing home.*

# Organization of LTC provision

- The Swiss health care system is based on private health care insurance and **formal LTC services are framed within the federal law on health care insurance.**
- There are 4 administrative levels involved:
  1. Confederation: sets general guidelines (eg: the procedures for the assessment of the intensity of care required by patients, the maximum contribution of insurers and patients to cover LTC expenditure, etc.);
  2. Cantons: plan LTC provision and set the practical guidelines of the LTC market (eg: accredit providers, set quality standards, monitor the functioning of the LTC market, etc.);
  3. Districts: organizational units for home-based care services;
  4. Municipalities: organize and guarantee the provision of LTC on their territory.

# Data

Main datasets (years 2007-2013):

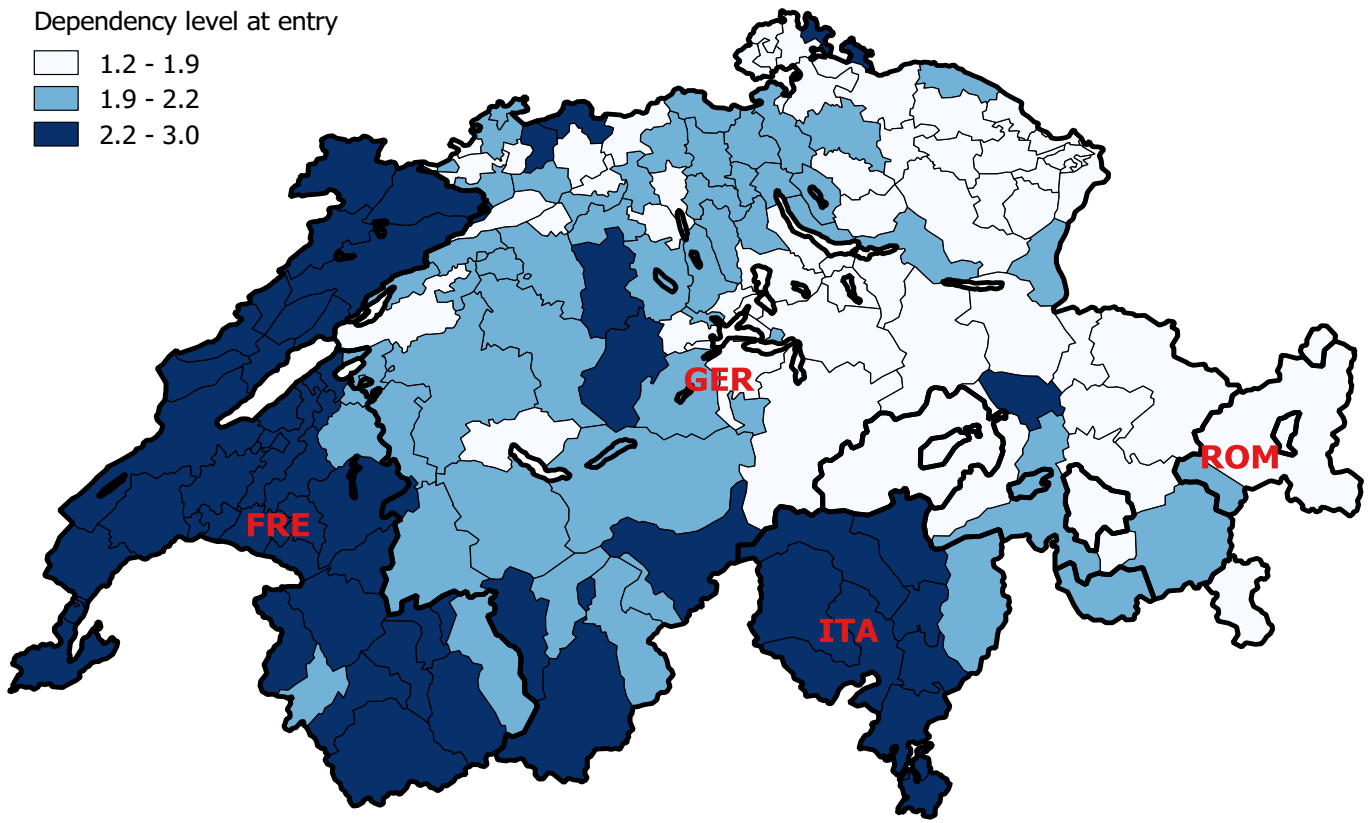
- **Statistics on socio-medical institutions (SOMED)** - data about nursing home patients;
- **Home care survey (HC)** - data about formal home-based care provision.

Other sources of data:

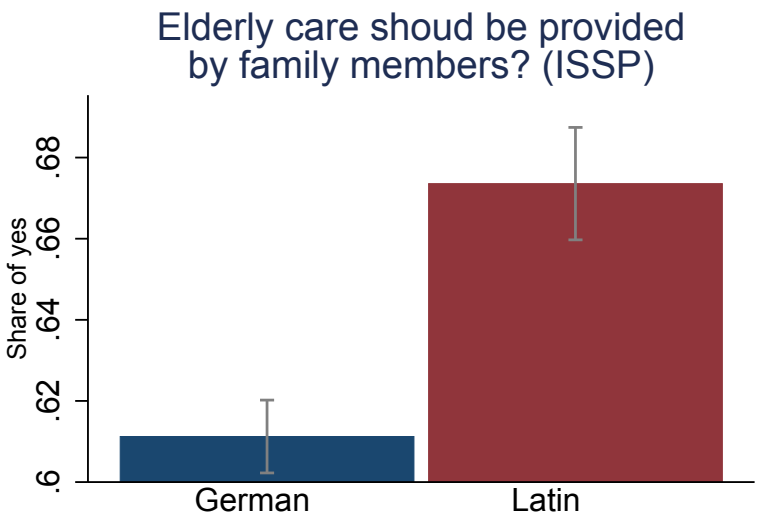
- Population and referendum data from the Federal Statistical Office;
- Income data from the Federal Tax Administration.

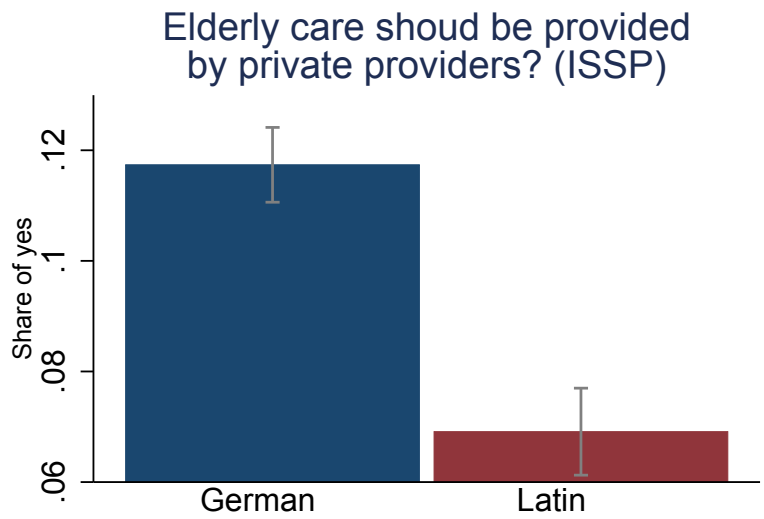
Proxy for cultural preferences: Referendum on the introduction of a constitutional article promoting work-life balance (FF 2012 5223).

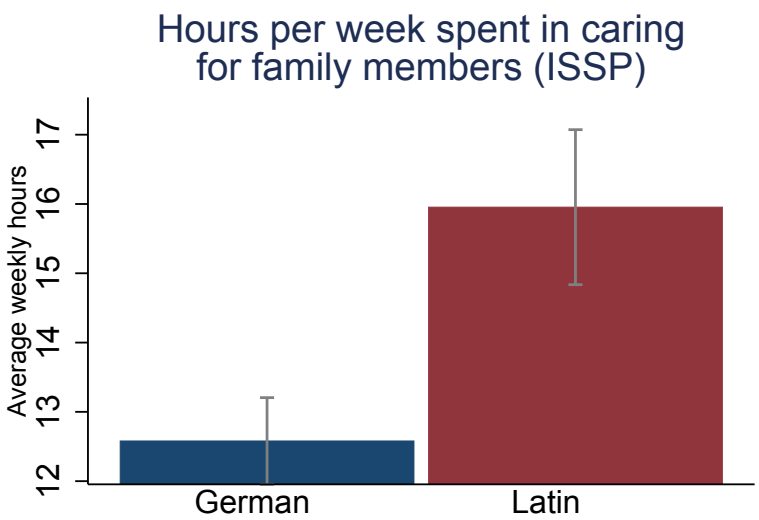
# A map of dependency level at entry

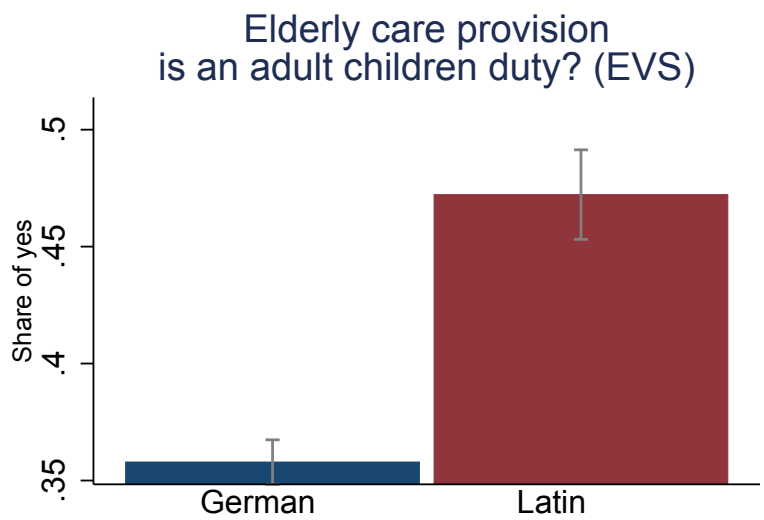


# Swiss cultural differences



# Regression discontinuity design

Fuzzy design - The reduced-form local linear regression is:

$$D_i = \beta_0 + \beta_1 F_i + \beta_2 km_i + \beta_3 Z_i + \beta_4 F_i km_i + \varepsilon_i$$

- $D_i$ is the dependency level at entry of individual i;
- $F_i$ represents the treated, i.e. residing in the French-speaking area before entry in nursing home;
- $km_i$ is the assignment variable, i.e. the kilometric travel distance from the closest French-speaking municipality on the linguistic border;
- $Z_i$ are the control variables, i.e. canton and year of entry.

Estimates for the first stage are provided by Eugster et al. (2011).

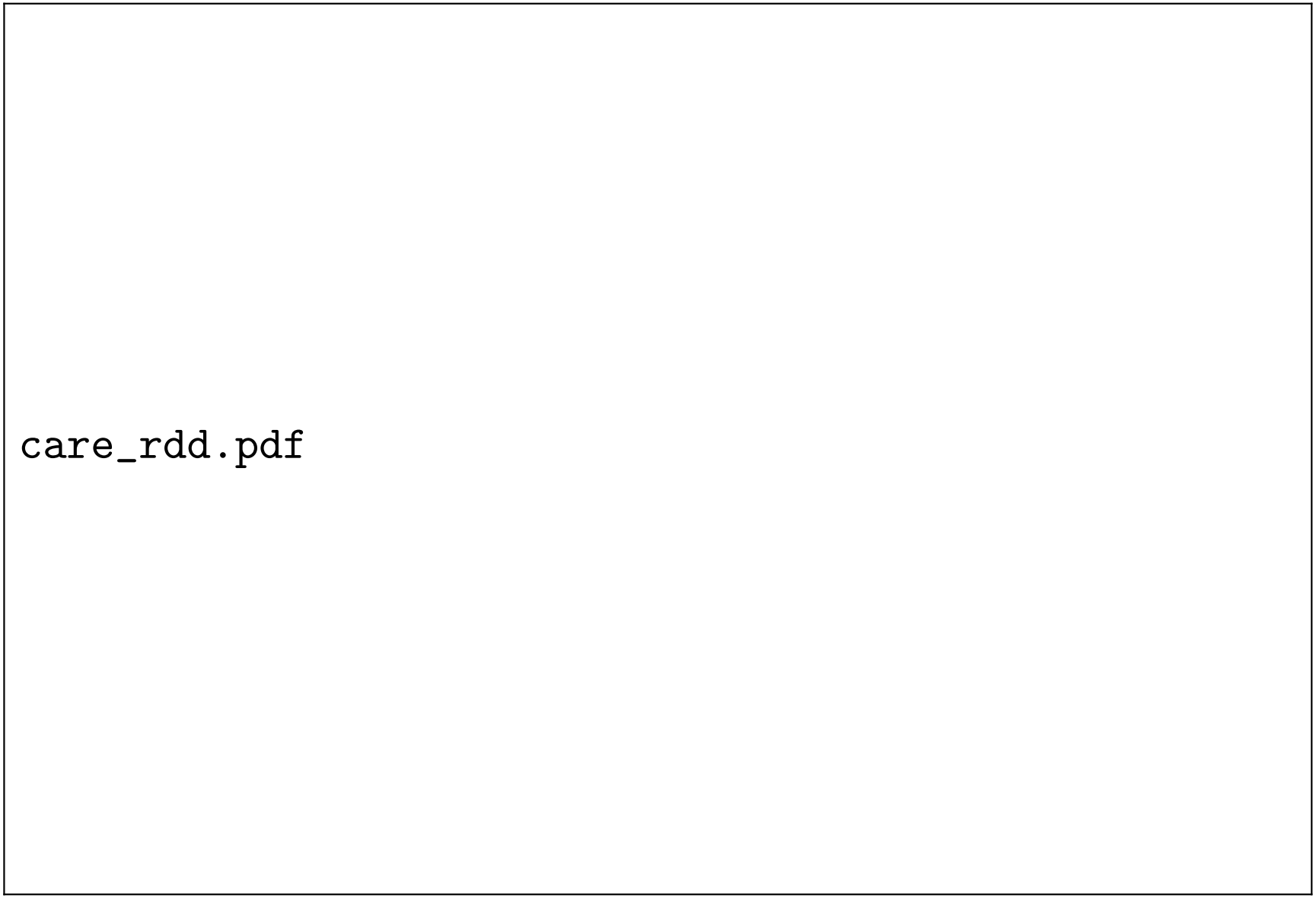
# Descriptive statistics - Individual level

Panel A: *Individual level*

| Variable | Obs. | Mean | Std. Dev. |
|---|---|---|---|
| Dependency level at entry | 41,607 | 2.09 | 1.01 |
| Age at entry | 41,607 | 83.87 | 8.17 |
| Gender | 41,607 | .34 | |
| Residing at home | 40,588 | .51 | |

| | *French* | | *German* | | t-test |
|---|---|---|---|---|---|
| Variable | Obs. | Mean | Obs. | Mean | P-value |
| Dependency level at entry | 10,193 | 2.58 | 31,414 | 1.93 | 0.000*** |
| Age at entry | 10,193 | 83.93 | 31,414 | 83.85 | 0.508 |
| Gender | 10,193 | .330 | 31,414 | .340 | 0.309 |
| Residing at home | 9,968 | .334 | 30,620 | .565 | 0.000*** |

# Dependency level at entry at the linguistic border



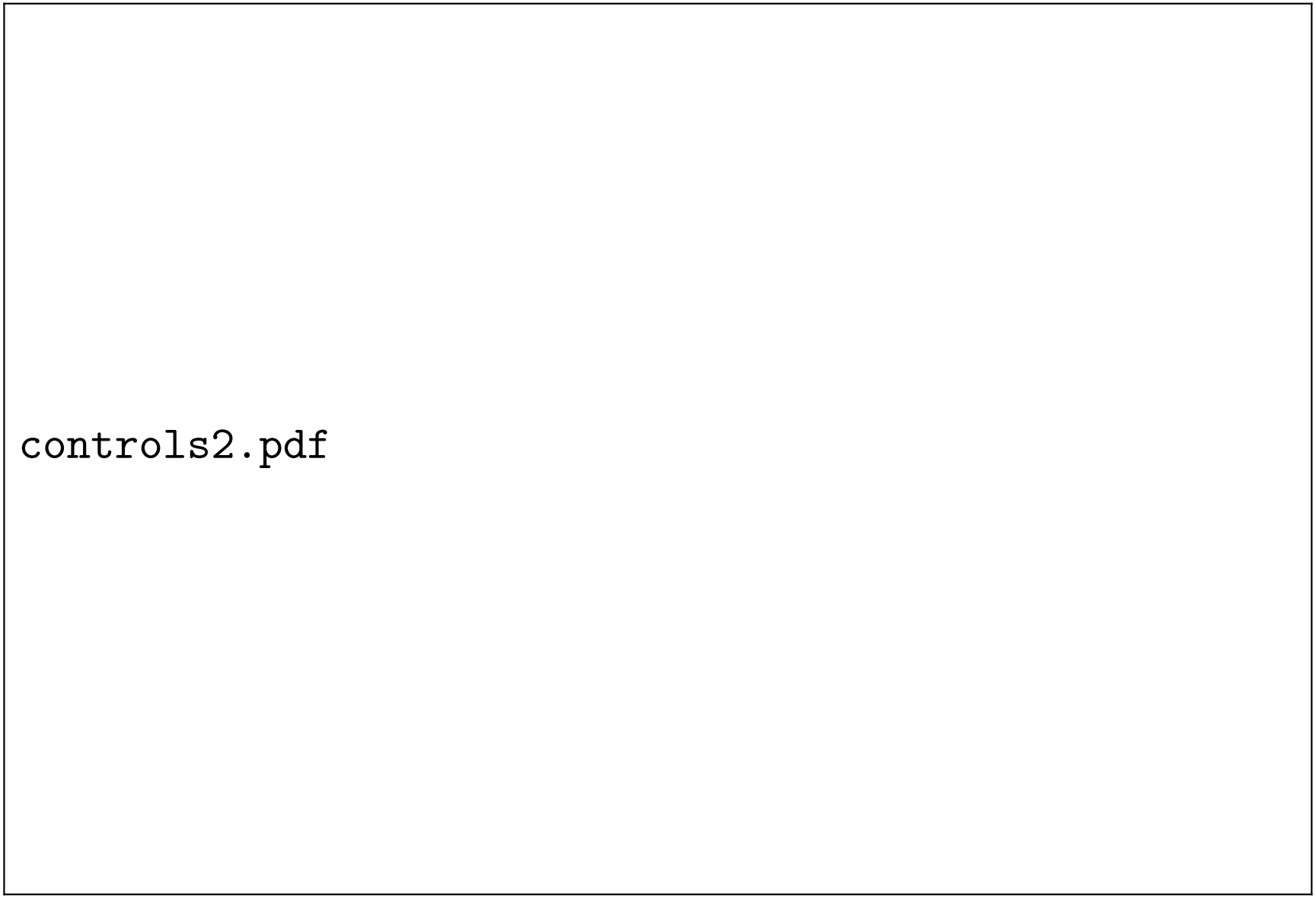
# Preferences for family policies at the linguistic border

ref_fam.pdf

# Gender

gender_rdd.pdf

# Other control variables



# Regression discontinuity analysis

| Dep. variable: | *Dependency level at entry* | | |
|---|---|---|---|
| Variable | Conventional | Bias-Corrected | Robust |
| Treatment effect | .105*** | .101*** | .101** |
| | (.04) | (.04) | (.05) |
| Observations on the left | 31,414 | 31,414 | 31,414 |
| Observations on the right | 10,190 | 10,190 | 10,190 |
| Bandwidth | 19.56 | 19.56 | 19.56 |
| Mean of dependent variable | 2.34 | 2.34 | 2.34 |
| Std. dev. of dependent variable | 1.02 | 1.02 | 1.02 |

# Summary of results

- The Latin-German gap ranges from 0.105 to 0.101 according to the specification used;
- The average treatment effect seems to be quite robust across different parametric and non-parametric specifications;

▸ Robustness checks

- In the bias-corrected robust specification the treatment effect accounts for 13% of the standard deviation (after accounting for first stage inflation).

# Descriptive statistics - District level

Panel B: *District level*

| Variable | Observ. | Mean | Std. Dev. |
|---|---|---|---|
| Dependency level at entry | 1,036 | 2.19 | .46 |
| Home-care hours | 959 | 8.52 | 5.88 |
| Age at entry | 1,036 | 83.5 | 1.45 |
| Latin language | 1,036 | .33 | .39 |
| Referendum (% 'yes') | 1,036 | .51 | .12 |
| Urbanization | 1,036 | 2.55 | .41 |
| NHs price | 1,036 | 241.10 | 38.41 |
| Share over 65 | 1,036 | .17 | .02 |
| Death rate | 1,036 | .01 | .00 |
| Imposable income (log) | 740 | 10.36 | .20 |

# Differences in formal care use by linguistic regions

| Column | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | *Dependency level at entry* | | |
| Latin language | 0.545*** | 0.190*** | 0.190*** | 0.163** | 0.173** |
| | (0.05) | (0.07) | (0.07) | (0.06) | (0.07) |
| Observations | 1,036 | 1,036 | 1,036 | 1,036 | 888 |
| R-squared | .234 | .424 | .642 | .704 | .699 |
| Mean of dep. variable | 2.19 | 2.19 | 2.19 | 2.19 | 2.19 |
| Std. dev. of dep. variable | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| | | | *Home-care hours* | | |
| Latin language | 3.612** | 2.559 | 2.716* | 3.123* | 3.129** |
| | (1.58) | (1.76) | (1.60) | (1.61) | (1.55) |
| Observations | 959 | 959 | 959 | 959 | 815 |
| R-squared | .055 | .175 | .257 | .275 | .319 |
| Mean of dep. variable | 8.52 | 8.52 | 8.52 | 8.52 | 8.52 |
| Std. dev. of dep. variable | 5.88 | 5.88 | 5.88 | 5.88 | 5.88 |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes |
| Canton fixed effects | No | Yes | Yes | Yes | Yes |
| Cantonal time trends | No | No | Yes | Yes | Yes |
| Time varying controls | No | No | No | Yes | Yes |
| Imposable income (log) | No | No | No | No | Yes |

# Differences in formal care use by voting behaviour

| Column | (1) | (2) | (3) |
|---|---|---|---|
| | *Dependency level at entry* | | |
| Latin language | 0.163** | | 0.047 |
| | (0.06) | | (0.08) |
| Referendum (% 'yes') | | 0.716*** | 0.604** |
| | | (0.24) | (0.30) |
| Observations | 1,036 | 1,036 | 1,036 |
| R-squared | .704 | .706 | .706 |
| Mean of dependent variable | 2.19 | 2.19 | 2.19 |
| Std. dev. of dependent variable | 0.46 | 0.46 | 0.46 |
| | *Home-care hours* | | |
| Latin language | 3.123* | | -0.050 |
| | (1.61) | | (2.27) |
| Referendum (% 'yes') | | 16.686** | 16.797* |
| | | (6.48) | (8.79) |
| Observations | 959 | 959 | 959 |
| R-squared | .275 | .286 | .286 |
| Mean of dependent variable | 8.52 | 8.52 | 8.52 |
| Std. dev. of dependent variable | 5.88 | 5.88 | 5.88 |
| Year fixed effects | Yes | Yes | Yes |
| Canton fixed effects | Yes | Yes | Yes |
| Cantonal time trends | Yes | Yes | Yes |
| Time varying controls | Yes | Yes | Yes |

# Summary of results

- Latin-speaking districts show higher dependency levels at entry and formal home-based care use than German-speaking districts;
- After controlling for institutional factors the Latin-German gap in dependency levels accounts for 35% of the standard deviation and the Latin-German gap in home-based care use accounts for around 50% of the standard deviation;
- Differences in formal LTC arrangements use seem to reflect differences in social preferences;

# Conclusions

- People from Latin speaking regions enter in nursing homes **in worse health conditions** and **demand more home-based care** services;
- **Culture seems to be an important determinant of LTC arrangement decisions** and influence the extent of their substitutability;
- In designing policies for the LTC market, **policy makers should be aware** of these results **to correctly internalize the behavioural responses** of the individuals either in a cost containment or in a welfare maximization perspective.

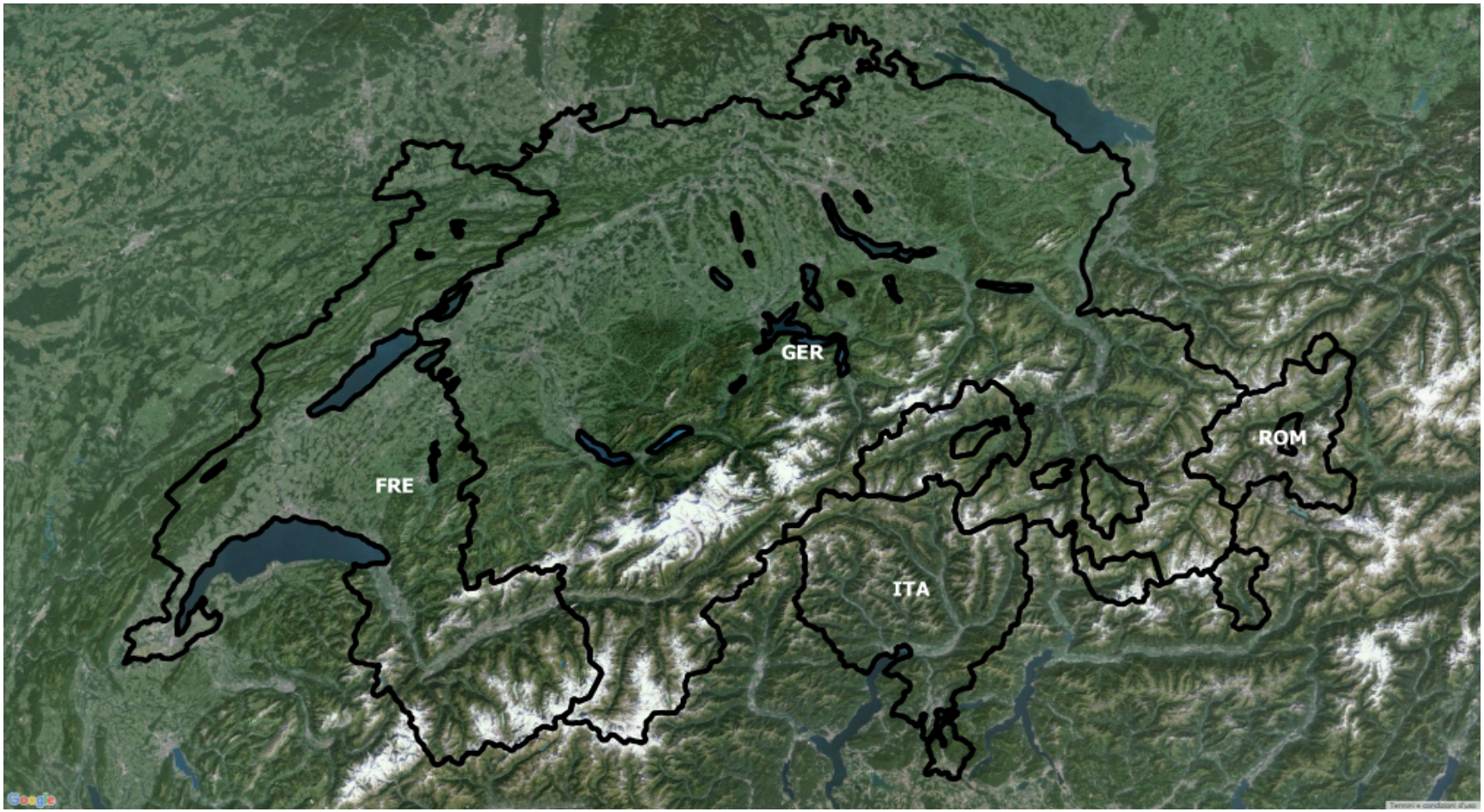
# Informal care: Switzerland vs. Europe

Table III. Descriptive statistics on informal care

| | Annual hours of informal care | | Any informal care | | Annual hours of informal care given > 0 | |
|---|---|---|---|---|---|---|
| Country | Mean | SD | Mean | SD | Mean | SD |
| Austria | 121.78 | 469.53 | 0.38 | 0.48 | 324.15 | 722.97 |
| Germany | 152.78 | 667.72 | 0.40 | 0.49 | 382.39 | 1015.61 |
| Sweden | 50.08 | 329.50 | 0.42 | 0.49 | 119.60 | 502.03 |
| The Netherlands | 56.02 | 219.55 | 0.42 | 0.49 | 132.42 | 322.77 |
| Spain | 206.37 | 1110.48 | 0.19 | 0.39 | 1091.38 | 2374.96 |
| Italy | 242.26 | 1295.64 | 0.21 | 0.41 | 1141.54 | 2638.88 |
| France | 145.49 | 735.60 | 0.33 | 0.47 | 444.86 | 1237.28 |
| Denmark | 52.95 | 218.43 | 0.40 | 0.49 | 131.68 | 329.67 |
| Greece | 232.09 | 711.78 | 0.38 | 0.49 | 614.68 | 1053.70 |
| Switzerland | 19.93 | 73.57 | 0.29 | 0.46 | 67.96 | 123.98 |
| Total | 132.33 | 680.52 | 0.35 | 0.48 | 374.86 | 1105.26 |

- Source: Bolin et al., 2008 using SHARE data (sample: singles with at least one child).

# Physical map

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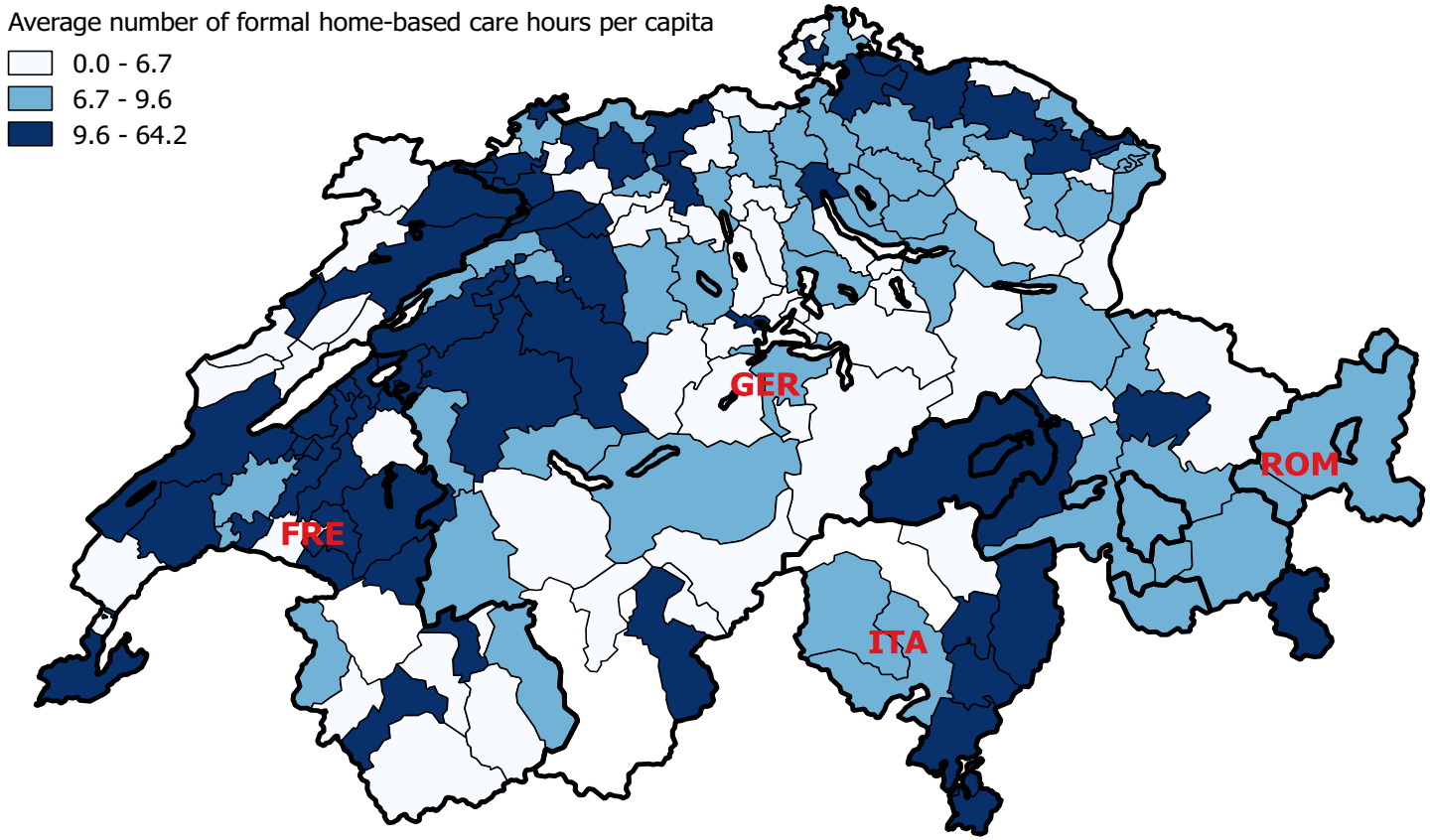
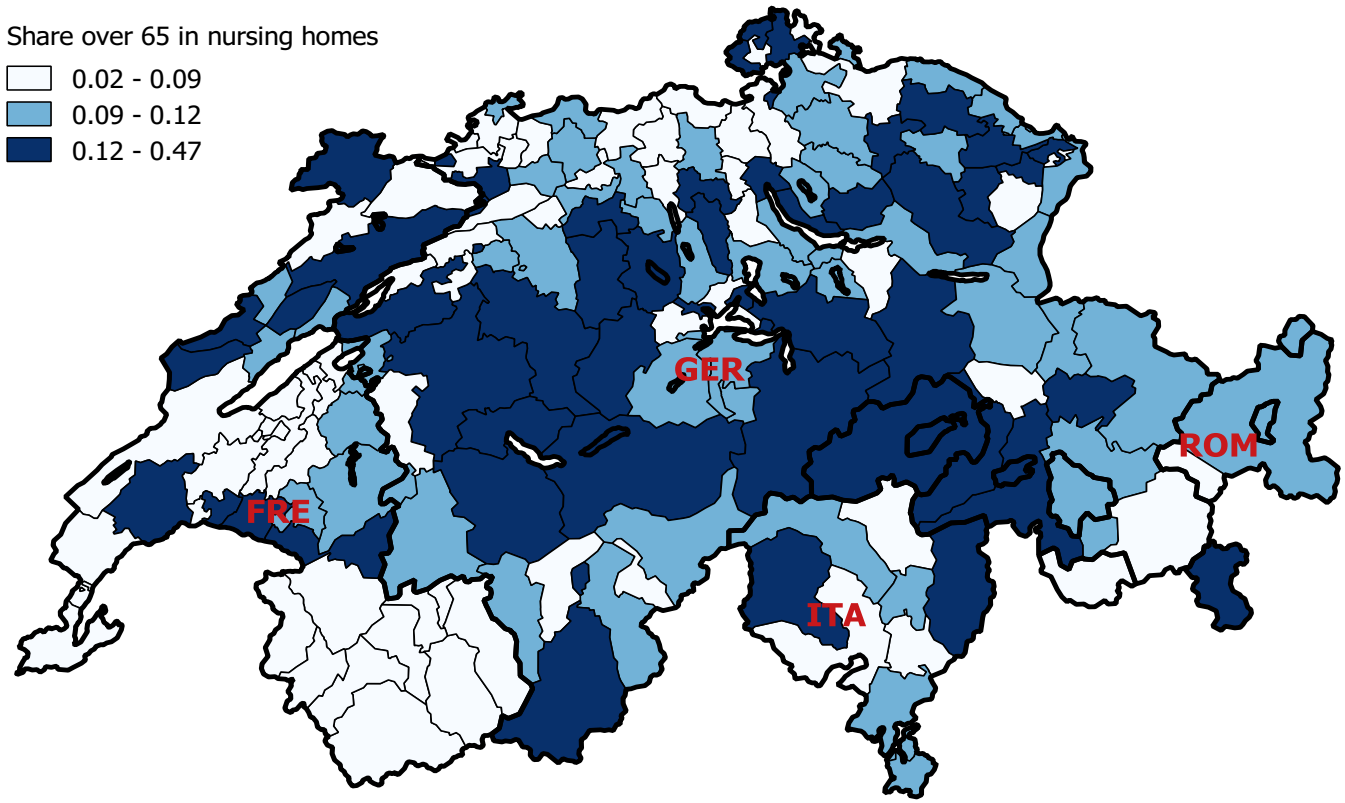
# A map of formal home-based care use



# A map of nursing home care use



# LTC arrangement use: Dependency level at entry (2)

We dealt with two issues:

1. Some individuals **enter and exit several times** from the nursing home.
   - First, we exclude the people explicitely staying for a short period;
   - Then, we adopt a simple algorithm to determine which entry date to consider as the effective one.
2. Individuals entering in the nursing home in the last few months of the year may display lower average intensity of care received at entry because **treatments may be delayed to the following year.**
   - Whenever people entered between October and December did not display any treatment, we assigned them the first treatment received the following year, if present.

# Algorithm to assign the actual entry date

For people showing repeated entry and exit dates:

1. Keep the first entry date if the individual did not go back home for more than 6 months;
2. Exclude the first entry date if an individual went back home for more than 6 months before entering again;
3. If the first entry date has been excluded from the sample, replicate the algorithm for the second entry date and so on.

# LTC arrangement use: Dependency level at entry

**Main idea:** *the higher the preference for care at home, the more dependent the people entering in nursing homes.*

- Our measure of dependency is **the intensity of care received** within the nursing home.
- The intensity of care required by each elderly person is assessed according to some measurement scales. **Each scale can be converted into minutes of care received.**
- We collapsed all the measurement scales into a single measurement scale ranging from 1 to 4. Clients who did not receive any treatment were assigned a 0.
- Given that each client may show several treatments received, we focus on the first one.
- For each treatment we only know the ending date, not the starting date.

# Description of variables (1)

| Panel A: *Individual level* | |
|---|---|
| Dependency level | Discrete variable ranging from 0 to 4. 0 corresponds to no care required, while 4 is the maximum level of care required. *Source: SOMED.* |
| Age at entry | Discrete variable counting age. People entering before 50 years old are excluded from the sample. Source: SOMED. |
| Gender | Dummy variable equal to 1 for men. *Source: SOMED.* |
| Residing at home | Dummy variable equal to 1 if the elderly person resided at home before entering the nursing home and equal to 0 if the elderly person stayed in a hospital or in another institution. *Source: SOMED.* |

# Description of variables (2)

| Panel B: *District level* | |
|---|---|
| Dependency level | Discrete variable ranging from 0 to 4. 0 corresponds to no care required, while 4 is the maximum level of care required. Average by district. *Source: SOMED.* |
| Home-care hours | ratio between the number of hours of formal home-based care provided and the population above 65 living in the district. This is a per capita measure of home-based care. *Source: HCS.* |
| Age at entry | Discrete variable counting age. People entering before 50 years old are excluded from the sample. *Source: SOMED.* |
| Latin language | Share of people speaking French, Italian or Romansh out of total resident population in the district. *Source: Federal Statistical Office.* |
| Referendum (% 'yes') | Share of people voting 'yes' to the 2013 referendum on family policies about the introduction of a constitutional article promoting work-life balance. *Source: Federal Statistical Office.* |
| Urbanization | Categorical variable ranging from 1 to 3. In particular, 1 corresponds to the highest level of urbanization and 3 to the lowest. *Source: Federal Statistical Office.* |
| NHs price | average price of one day of care in nursing homes. Given that more detailed measures of prices are not available, we divide the total revenue of nursing homes in the district by the number of clients. *Source: SOMED.* |
| Share over 65 | Share of people above 65 years old out of the overall district population. Since population data by age are not available before 2010, we project the share of elderly people in 2010 on the population between 2007 and 2009. *Source: Federal Statistical Office.* |
| Death rate | Ratio between the number of deaths in a year and the overall population. *Source: Federal Statistical Office.* |
| Imposable income (log) | Logarithm of imposable income. *Source: Federal Tax Administration.* |

# Non-parametric Regression Discontinuity Design without controls

| Dep. variable: | *Dependency level at entry* | | |
|---|---|---|---|
| Variable | Conventional | Bias-Corrected | Robust |
| Treatment effect ($\beta_1$) | .388*** | .419*** | .419*** |
| | (.09) | (.09) | (.10) |
| Observations on the left | 31,414 | 31,414 | 31,414 |
| Observations on the right | 10,190 | 10,190 | 10,190 |
| Bandwidth | 10.22 | 10.22 | 10.22 |
| Mean of dependent variable | 2.29 | 2.29 | 2.29 |
| Std. dev. of dependent variable | 1.02 | 1.02 | 1.02 |

# Parametric Regression Discontinuity Design

| Dep. variable: | *Dependency level at entry* | | | | | |
|---|---|---|---|---|---|---|
| Treatment effect ($\beta_1$) | 0.123** | 0.093* | 0.141*** | 0.103** | 0.041 | 0.028 |
| | (0.05) | (0.05) | (0.04) | (0.05) | (0.05) | (0.05) |
| Baseline ($\beta_0$) | 1.810*** | 1.846*** | 1.757*** | 1.751*** | 1.748*** | 1.757*** |
| | (0.05) | (0.05) | (0.03) | (0.03) | (0.04) | (0.05) |
| Observations | 12,781 | 27,500 | 39,991 | 41,604 | 41,604 | 41,604 |
| Dep. var. mean | 2.33 | 2.16 | 2.10 | 2.09 | 2.09 | 2.09 |
| Dep. var. std. dev. | 1.02 | 1.03 | 1.01 | 1.01 | 1.01 | 1.01 |
| Bandwidth: | 25 km | 50 km | 100 km | Full sample | Full sample | Full sample |
| Polynomial fit: | Linear | Linear | Linear | Quadratic | Cubic | Quartic |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |

# Non-parametric Regression Discontinuity Design with other dependent variables

| Variable | Conventional | Bias-Corrected | Robust |
|---|---|---|---|
| | | *Residing at home* | |
| Treatment effect ($\beta_1$) | -.075*** | -.065*** | -.065*** |
| | (.02) | (.02) | (.02) |
| Observations on the left | 30,620 | 30,620 | 30,620 |
| Observations on the right | 9,965 | 9,965 | 9,965 |
| Bandwidth | 17.26 | 17.26 | 17.26 |
| Mean of dependent variable | .43 | .43 | .43 |
| Std. dev. of dependent variable | .50 | .50 | .50 |
| | | *Age at entry* | |
| Treatment effect ($\beta_1$) | .589 | .725 | .725 |
| | (.50) | (.50) | (.62) |
| Observations on the left | 31,414 | 31,414 | 31,414 |
| Observations on the right | 10,190 | 10,190 | 10,190 |
| Bandwidth on the left | 13.88 | 13.88 | 13.88 |
| Mean of dependent variable | 83.80 | 83.80 | 83.80 |
| Std. dev. of dependent variable | 8.05 | 8.05 | 8.05 |

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Appendix

# Cantonal variation in language spoken by district

| Canton | Mean | Std. Dev. |
|---|---|---|
| AG | .07 | .01 |
| AI | .02 | 0 |
| AR | .04 | .01 |
| BE | .17 | .26 |
| BL | .07 | .02 |
| BS | .11 | 0 |
| FR | .70 | .31 |
| GE | .86 | 0 |
| GL | .08 | 0 |
| GR | .40 | .31 |
| JU | .94 | .00 |
| LU | .04 | .02 |
| NE | .94 | .02 |
| NW | .05 | 0 |
| OW | .03 | 0 |
| SG | .05 | .01 |
| SH | .04 | .01 |
| SO | .06 | .02 |
| SZ | .04 | .03 |
| TG | .05 | .01 |
| TI | .92 | .04 |
| UR | .03 | 0 |
| VD | .88 | .03 |
| VS | .59 | .41 |
| ZG | .07 | 0 |
| ZH | .08 | .02 |

# Difference in dependency levels at entry and home-based care use by linguistic region without bilingual cantons

| Column | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | | | *Dependency level at entry* | | |
| Latin language | 0.505*** | 0.207** | 0.207** | 0.314** | 0.348** |
| | (0.05) | (0.13) | (0.14) | (0.14) | (0.14) |
| Observations | 826 | 826 | 826 | 826 | 708 |
| R-squared | .193 | .338 | .583 | .650 | .633 |
| Mean of dep. variable | 2.14 | 2.14 | 2.14 | 2.14 | 2.14 |
| Std. dev. of dep. variable | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 |
| | | | *Home-care hours* | | |
| Latin language | 5.180** | 6.305** | 6.526*** | 8.357*** | 8.525*** |
| | (2.10) | (2.53) | (2.48) | (2.88) | (2.71) |
| Observations | 778 | 778 | 778 | 778 | 662 |
| R-squared | .089 | .185 | .265 | .284 | .337 |
| Mean of dep. variable | 8.63 | 8.63 | 8.63 | 8.63 | 8.63 |
| Std. dev. of dep. variable | 6.29 | 6.29 | 6.29 | 6.29 | 6.29 |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes |
| Canton fixed effects | No | Yes | Yes | Yes | Yes |
| Cantonal time trends | No | No | Yes | Yes | Yes |
| Time varying controls | No | No | No | Yes | Yes |
| Imposable income (log) | No | No | No | No | Yes |